Defining Airmanship

Pushing training back to basics

By Richard N. Aarons
Safety Editor
bcasafety@yahoo.com

TWO BAE SYSTEMS RESEARCHERS — LOUISE EBBAGE FROM BAE'S Advanced Technology Center and Phil D. Spenser from BAE's Training Solutions operation — attempted to define "airmanship" in a paper presented during a 2003 NATO symposium. Exploring the literature they turned up several definitions. Here are a few (see the box at the end of the story if you want to learn more about these sources).

Airmanship is:

- Effective decision making to support a sequence of actions.
- The care and attitude that you bring to the conduct of your flying. It encompasses consideration for your passengers, care of your aircraft, courtesy to other airspace and airfield users, and the self-discipline to prepare and conduct your flights in the most professional manner possible. It is not just flying skill that distinguishes a good pilot; it is his or her standard of airmanship.
- A personal and situational management state required to allow a human being to enter and exit in safety, an environment that they were not naturally designed to inhabit. The consistent use of good judgment and well-developed skills to accomplish flight objectives. This consistency is founded on a cornerstone of uncompromising flight discipline and developed through systematic skill acquisition and proficiency. A high state of situational awareness completes the airmanship picture and is obtained through knowledge of one's self, aircraft, team environment and risk.

Ultimately Ebbage and Spenser concluded that airmanship could be defined as:

A personal state that enables air crews to exercise sound judgment, display uncompromising flight discipline and demonstrate skillful control of an aircraft and a situation. It is maintained by continuous self-improvement and a desire to perform optimally at all times.

My first flight instructor — an old C-54 driver — summed up airmanship this way:

Know your airplane; know what's going on around you; fly the airplane; always leave yourself an out. (Personally, I like this one.)

So, what's the relevance of all of this to this month's accident report? Only that we're seeing far too many just like this one. Change the names, N-numbers and locations and you'll find a half dozen just like it each year. So, review the details; give this type of accident some thought and share those thoughts with your friends in the business pilot community — especially those who may be flying high-performance light aircraft in conditions that generate high workloads and require high performance of the pilot.

The Accident

A Beechcraft 58 Baron crashed on April 22, 2011, at about 1213 local time while executing a missed approach at Phillip Billard Municipal Airport (TOP) in Topeka, Kan. The aircraft was being operated under FAR Part 91 as a personal flight. The private pilot and his three passengers died from injuries sustained at impact and in the fire that followed.

The cross-country flight had originated at 1045 that morning from Scott City, Kan., Municipal Airport (TQK). The 35-year-old pilot filed IFR and the trip proceeded normally under instrument conditions until it reached the Topeka area. At 1153, the METAR for TOP was wind, 010 deg. at 9 kt.; visibility, 10 sm; ceiling, 500 ft. overcast; temperature, 55F; dew point, 53 deg.; altimeter, 29.64 — with the following remark: variable ceiling height, 400 to 800 ft.

An hour later — at 1253 — TOP reported wind, 340 deg. magnetic at 5 kt.; visibility, 6 sm with light rain; ceiling, 700 ft. overcast; temperature, 55F; dew point, 53 deg.; altimeter, 29.65.

At **1146,** the pilot checked in with Kansas Center and the controller cleared the airplane to descend to 5,000 ft. MSL. The pilot then asked the controller what runway was in use at TOP, and the controller responded that Runway 31was active and that TOP was broadcasting for the back course localizer approach. The controller then asked if the pilot wanted vectors to the approach, and the pilot said that he did.

At **1156:56,** the center controller contacted Topeka tower and informed them that the Baron would be 4 mi. south of UJASA, a radar-established intersection on the final approach course, in 4 min.

At **1200:05,** the center controller informed the pilot that he was 6 mi. south of UJASA and to fly a heading of 340 deg. to intercept the inbound radial for the approach. The pilot acknowledged the heading.

At **1200:28,** the controller cleared the pilot for the approach.

At **1202:35,** the center controller informed the pilot that he had flown through the radial and asked if the pilot showed himself establishing on the inbound course? The pilot responded, "I'm working it . . ."

The controller then gave the pilot another heading to intercept the radial. The pilot responded, acknowledging the heading.

At **1205:40,** the controller contacted Topeka tower and informed them that the airplane had flown through the radial and was 6 mi. south of the airport. The tower controller acknowledged.

At **1205:57,** the center controller informed the pilot that he was still cleared for the approach, that radar service was terminated, and to contact Topeka tower.

A tower controller reported seeing the airplane break out of the clouds approximately 1,000 ft. beyond the approach

end of Runway 31 and "well left of Runway 31 and taxiway Charlie." Two pilot witnesses on the ground observed the Baron flying in a level flight attitude about halfway down Runway 31. The airplane's landing gear was extended and the witnesses estimated the airplane's altitude as being about 200 to 300 ft. above the runway.

At **1208:05,** the pilot told the tower that he was going missed approach and then requested if he could circle to land.

When the airplane was near the runway's end, the witnesses observed the landing gear retract and the airplane begin a slow climb into the clouds. The witnesses estimated the overcast ceiling to be at 500 ft. AGL and the visibility to be 2.5 mi.

Topeka tower directed the pilot to fly runway heading and told him that they would get with center for climb-out instructions.

The pilot then said he could do the GPS approach for Runway 36. The tower controller instructed the pilot to execute the published missed approach and climb and maintain 4,000 ft. The pilot acknowledged and read back the instructions. The tower controller called center and informed them of the pilot's intentions.

At **1209:15,** Topeka tower instructed the pilot to contact Kansas City Center. The pilot replied with reading back the frequency.

At **1209:22,** he contacted center and informed them he was on the missed approach.

The center controller instructed the pilot to climb to 3,000 ft., then make a right turn and fly direct to the WUPLA intersection for the GPS approach to Runway 31.

At **1211:32,** the center controller told the pilot to maintain 3,600 ft. until established on the approach and that he was cleared for the GPS approach to Runway 31.

The pilot acknowledged and read back the altitude. That was the last transmission received from the airplane. The controller then said, "and November zero echo alpha, when you . . . executed the back course [you] were just too high to . . . execute the . . . correction to . . . land."

Later, radar data showed the airplane had been over the airport at 1208:48 at an altitude of 1,500 ft. MSL. (Airport elevation is 1,078 ft.) The data showed the airplane make a turn to the east and then southeast leveling off at 3,400 ft. MSL. The Baron then made a left 180-deg. turn back toward the west. At 1211:48, the airplane suddenly disappeared from radar.

Controllers tried to contact the airplane several times, but heard nothing.

Several people in the vicinity of the accident site reported hearing the airplane fly overhead. They all reported hearing the ground impact and seeing a fireball; however, none of the witnesses reported seeing the airplane crash.

The 1973 Model C Baron struck the ground in a

down-sloping, fallowed cornfield, about 4 mi. northeast of the airport. The elevation at the accident scene was 1,012 ft. MSL. The accident site began with a 21-ft.-long, 8-ft.-wide and 5-ft.-deep impact crater that contained both engines, both propellers, one main landing gear and the nose landing gear. The debris field was about 370 ft. long by 100 ft. wide.

Both engines had broken free of their mounts and nacelles. The right propeller was separated from its engine and rested nearby. The three blades showed varying degrees of chordwise scratches and leading edge gougings. All three blades showed torsional bending. The left engine was also broken out from the nacelle. The left propeller was broken and found underneath the engine. Two of its blades showed torsional bending. One blade had broken out at the hub. Measured crushing on the engines, and wing and nacelle fragments were consistent with the airplane impacting the terrain in a 25-deg. nose-low, 40- to 45-deg. left-wing-low flight attitude.

The empennage section and fuselage aft of the baggage compartment were located 81 ft. north-northeast of the impact crater along the 030-deg. wreckage path. The fuselage was bent and broken. The vertical stabilizer, rudder, horizontal stabilizers and elevators were bent and broken. Flight control continuity to the rudder and elevators was confirmed. Beyond the fuselage to the end of the accident site was a debris field that contained the fragmented components of the airplane's cabin, wings and forward fuselage. Many of the fractured pieces were charred, melted and consumed by the post-impact fire. A large section of the right wing was located about 30 ft. beyond the empennage section. Also within this area were broken engine components, flight and engine instruments, and personal effects.

Examination of the airplane's engines revealed no abnormalities that would have prevented their normal operation and production of rated horsepower. The examination of the other airplane systems revealed no pre-impact anomalies.

A Garmin Model 696 was recovered from the wreckage and sent to the NTSB's Vehicle Recorders Laboratory for examination and data retrieval. No information was gleaned from the unit.

The Human Factor

Ultimately, the investigators turned their attention to the pilot. He held a private pilot certificate with single-engine and multiengine land airplane and instrument airplane ratings. According to his logbook, the pilot had accumulated a total of 438 hr. Of that total time, 28.7 hr. were in multiengine airplanes and 17.5 hr. flown in the Beech 58. The logbook also showed that he had flown 30.1 hr. within the preceding 90 days, 20.1 hr. within the preceding 60 days and 8.7 hr. in the previous 30 days.

The pilot had logged 50 hr. of simulated instrument time and 11 hr. in actual instrument conditions. He passed an instrument

proficiency check five months prior to the accident but had logged only 0.7 hr. of instrument time between that check and the accident. The pilot also successfully completed a check flight for a multiengine airplane rating on Feb. 18, 2011. An autopsy was performed on the pilot. Toxicology testing of samples taken from him were negative.

NTSB investigators also looked at the high-workload approach sequence. A review of the ATC services provided to the pilot by the Kansas City Center indicates that the controller issued "incorrectly phrased instructions" to the pilot when the controller transmitted "N580EA is 6 mi. south of UJASA, fly heading 340, intercept the Topeka 129 radial for the back course Runway 31 approach." The pilot responded that he'd intercept the Topeka 129 for the back course for Runway 31.

The 30-deg. intercept angle met the proper approach course intercept standards required by FAA procedures; however the "129 radial" phraseology is more typically used as part of an ATC instruction related to VORs. The Topeka VOR was located 5 mi. northeast of the airport. The TOP VOR 129 radial was parallel to the localizer back course, but 5.5 nm northeast of it.

Investigators said the Topeka VOR and the TOP 129 radial were not used to define the final approach portion of the localizer back course 31 procedure, but the VOR is used as part of the missed approach procedure. Radar data showed that upon the pilot accepting the approach clearance, the airplane continued on the 340-deg. heading across the localizer back course. The airplane then turned to approximately 309 deg., the inbound heading for the back course localizer procedure on reaching the vicinity of the TOP VOR 129 radial and well north of the final approach course for the localizer.

Sources

The Ebbage-Spencer report on *Airmanship for Modern Aircrew* is an interesting read and can be found at: http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA428471&Location=U2&doc=GetTRDoc.pdf

The "airmanship definitions mentioned come from these sources:

[1] *Training Development and Support Unit Flying Training Development Wing, Airmanship* TDSYU/779/1/5/TRG 27 June 2000

[2] Hayes, T. (2002) Airmanship & flight discipline.

[3] Kern, T. (1996). *Redefining Airmanship*. McGraw-Hill.

At that time, the controller noted the pilot's apparent deviation from the localizer procedure and instructed him to fly a heading of 280 deg. "to intercept the 129 radial for the back course." The heading took the airplane back to the correct final approach course. The pilot intercepted the correct course at POACH, the final approach fix for the approach located 3.9 nm from the runway. The airplane at that time was at 2,900 ft. MSL. The published crossing altitude at POACH was 2,200 ft. The pilot executed the missed approach shortly afterward.

The Safety Board had yet to issue a determination of probable cause as we went to press. Certainly, decision-making, workload considerations and airplane handling will all be factors — in short, all the elements of airmanship regardless of how we define it. BCA